

**AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

**LISTING OF CLAIMS:**

1. (currently amended): A computer readable medium including a program having instructions, which when executed perform a radix 2 fast fourier transform on a digital series to produce signals in cyclically noncontinuous output bins, the instructions comprising:

determining the number  $2^s$  of FFT points, the output bin index  $O_s$ , and the input signal array;

determining the butterfly index for the last stage by

$$\Psi_{s-1} = O_s \% \left( \frac{N}{2} \right)$$

determining the butterfly index for each stage other than said last stage by

$$\Psi_{\ell-1} = \Psi_{\ell} \% \left( \frac{N}{2^{s-\ell+1}} \right)$$

where  $\ell$  varies from 1 to (S-1);

using said butterfly index, calculating only those butterflies necessary for calculation of the output bins, and

providing to storage or further processing said signals in cyclically noncontinuous output bins.

2. (previously presented): The computer readable medium according to claim 1, wherein said determining the butterfly index for all later stages is performed in numerical order.

3. (previously presented): The computer readable medium according to claim 2, wherein said numerical order is ascending order.

4. (previously presented): The computer readable medium according to claim 1, further including the determination of output bins, wherein:

for stage  $\ell$ , where  $\ell$  varies from 1 to S, executing only that butterfly in the butterfly index set  $\Psi_{\ell-1}$  of that stage;

for stage  $\ell$ , loading the twiddle factor corresponding to the butterfly index set  $\Psi_{\ell-1}$  of that stage; and

repeating (a) executing only that butterfly in the butterfly index set  $\Psi_{\ell-1}$  of that stage and (b) loading the twiddle factor corresponding to the butterfly index set  $\Psi_{\ell-1}$  of that stage, until the required final stage butterflies are executed and the required output bins are filled.

5. (previously presented): The computer readable medium according to claim 1, wherein using said butterfly index further comprises:

setting the butterfly index set  $\Psi_j$  where  $(1 \leq j \leq S-1)$  and the selected output node index set ranges from  $O_S$  to  $M_S$  by

(a) for  $(1 \leq j \leq S-1)$

- (i) if  $(k \in \Psi_j)$  or  $\Psi_j$  contains index k, then setting  $m_j^k = 1$ ,
- (ii) if  $(k \notin \Psi_j)$ , then setting  $m_j^k = 0$ ,

(b) for  $j = S$

- (i) if  $(k \in O_S)$ , or  $O_S$  contains index k, then setting  $m_j^k = 1$ ,
- (ii) if  $(k \notin O_S)$ , or  $O_S$ , then setting  $m_j^k = 1$ ; and

controlling of a memory pair stage  $j$  by  $m_j^i$  ( $0 \leq i \leq 2^{j-1}-1$ ) and  $m_j^{i+Y}$ , ( $Y = 2^{j-1}$ ).

6. (previously presented): The computer readable medium according to claim 4, wherein setting the butterfly index includes, when  $0 \leq i \leq (2^{j-1}-1)$ :

controlling the butterfly adder with  $m_j^i$

controlling the butterfly subtractor with  $m_j^{i+Y}$ ; and

controlling the butterfly multiplier in accordance with the Boolean OR of  $m_j^i$  and  $m_j^{i+Y}$ .